AD NUMBER

ADB813732

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to DoD only; Administrative/Operational Use; 11 Feb 99. Other requests shall be referred to Defense Technical Information Center, DTIC-BCS, 8725 John J. Kingman Rd., Ft. Belvoir, VA 22060-6218.

AUTHORITY

19990524 - Mr James A. Morrow, Hq AFMC/PAX, Security & Policy Review, Office of Public Affairs.

The U.S. GOVERNMENT

IS ABSOLVED

FROM ANY LITIGATION WHICH MAY ENSUE FROM ANY INFRINGEMENT ON DOMESTIC OR FOREIGN PATENT RIGHTS WHICH MAY BE INVOLVED.

REEL - C

2100

A.T.I.

49157

UNCLASSIFIE

Control Surfaces - Elevator Rib - Outboard of 372 - Static Test Model XB-36

49157

(None)

Riefe, H. C.
Consolidated Vultee Aircraft Corp., Fort Worth Div., Texas
(Same)

FSG-129

(Same)

May '46 Unclass. U.S. English 8 photos, tables, graphs

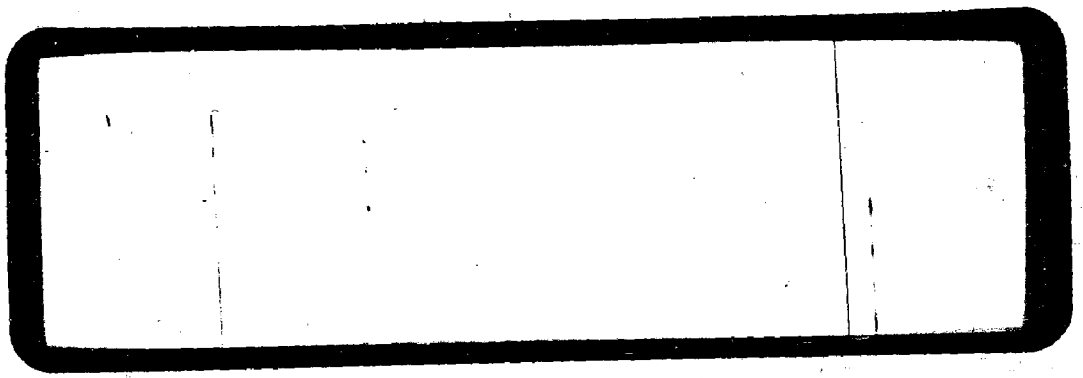
Static load tests were conducted on three specimens of the hydropressed magnesium alloy elevator rib for the B-36 bomber to determine their ultimate strength. All specimens were made of .025 gage AMC 52S-H, were identical in size, shape of beaded web cutouts, web stiffeners and beaded flanges, but one had a small flange reinforcing angle fastened near the area of the compression reaction attachment. The specimens were loaded at eight specified points with flanges stabilized laterally at, and midway between, the load points. Results showed that all specimens withstood the application and release of the design yield load without showing permanent set. The ultimate test loads varied only from 120 to 129% of the design ultimate load. All specimens failed in a similar manner by crippling of the compression flange near the attachment.

Copies of this report obtainable from CADO

(1)
Structures (7)
Design and Details (3)

Structural elements - Strength (90853.8);
XB-36 (99409)

AL 49157



RETURN TO
VAULT - UNIT

RECEIVED WITH
LETTER # FW-3974
DATED 9-23-46

CONSOLIDATED VULTEE AIRCRAFT CORPORATION
FORT WORTH DIVISION • FORT WORTH 1, TEXAS

GS-50

TEST NO. F-533
MODEL XB-36

REPORT FSG-129
DATE 5-28-46

TITLE

CONTROL SURFACES - ELEVATOR RIB - OUTBOARD OF 372 - STATIC TEST

SUBMITTED UNDER

PREPARED BY: H. C. Pierce

GROUP:

REFERENCE:

CHECKED BY: J. I. Kelly

APPROVED BY: R. S. Read

APPROVED BY: M. E. Atkinson

NO. OF PAGES 8

NO. OF DIAGRAMS 6

REVISIONS

NO.	DATE	BY	CHANGE	PAGES AFFECTED

Consolidated Vultee Aircraft Corporation
FORT WORTH DIVISION
FORT WORTH, TEXAS

Purpose:- To determine the ultimate strength of a magnesium alloy hydropressed elevator rib designed for the XB-36 Airplane.

Summary:- Three specimens of the hydropressed magnesium alloy elevator rib designed for the XB-36 airplane were static load tested in a like manner. All were made of .025 gage AMC 525-F, were identical to size, shape of beaded web cut-outs, web stiffeners and beaded flanges, but one had a small flange reinforcing angle fastened near the area of the compression reaction attachment. The specimens were loaded at eight specified points with their flanges stabilized laterally at and midway between the load points. The results of the tests were much the same for all specimens: they withstood the application and release of the design yield load without showing permanent set, the ultimate test loads varied only from 120 to 129% of the design ultimate (330 lbs. total), and all failed in a similar manner by crippling of the compression flange near the attachment.

Witnesses: [signature] AAF

[signature] U.S.A.

OBJECT: To determine the static load strength of each of three magnesium allow hydropressed elevator ribs designed for the XB-36 airplane.

DESCRIPTION OF SPECIMEN: The specimens made of .025 gage AMC52S-H were a beaded flange type with stiffened web and beaded edge cut-outs shown in Fig. 1. No. 1 specimen (Table I) was -7 (with flange reinforcing angle near attachment) and No. 3 was -6, before alteration B was added to the drawing. Spec. No. 2 is the -6 shown in Figure 1.

SET UP AND PROCEDURE: The specimens each in turn were tested in a jig designed to provide load distributed as shown in Figure 3. Lateral restraint on the flanges at and midway between load points was provided. Dial gages were used to measure the deflection of the rib at load points. A dynamometer, turnbuckle arrangement, and a whiffletree were used to apply the loads at the points indicated in Figure 3. The test set up is shown in Figure 2.

Load was applied in increments of 10% of the design ultimate up to the design yield and deflection readings taken as shown in Table I. Following this the load was released to note any permanent set after which the rib was reloaded to failure.

RESULTS: The results of the test are incorporated in Table I.

DISCUSSION: The results of tests on the three specimens followed much the same pattern. No permanent set was noted on any of the specimens after the application and removal of the design yield load of 220 lbs. (total load). The ultimate loads ranged from 400 to 425 lbs. or 120 to 129% of the design ultimate of 330 lbs. (total load). In all the tests a preliminary failure by buckling of web and flange appeared at approximately 110% of the design ultimate load. Final failure was the result of a crippling of the compression flange near the attachment. Figure 4 shows a typical failure.

The flange reinforcing angle incorporated in specimen number one was removed after this specimen had been tested; results from specimens 2 & 3 indicate this angle to be unnecessary.

CONCLUSION: The hydropressed magnesium alloy elevator rib (Ref. 36FTW548) designed for the XB-36 airplane withstood its design yield load without permanent deformation and exceeded its design ultimate load by 20 to 29%. It is considered structurally satisfactory for use on the XB-36 airplane. The reinforcing flange angle (ref. specimen #1) is not necessary.

CONSOLIDATED VULTEE AIRCRAFT CORPORATION
FORT WORTH DIVISION FORT WORTH, TEXAS

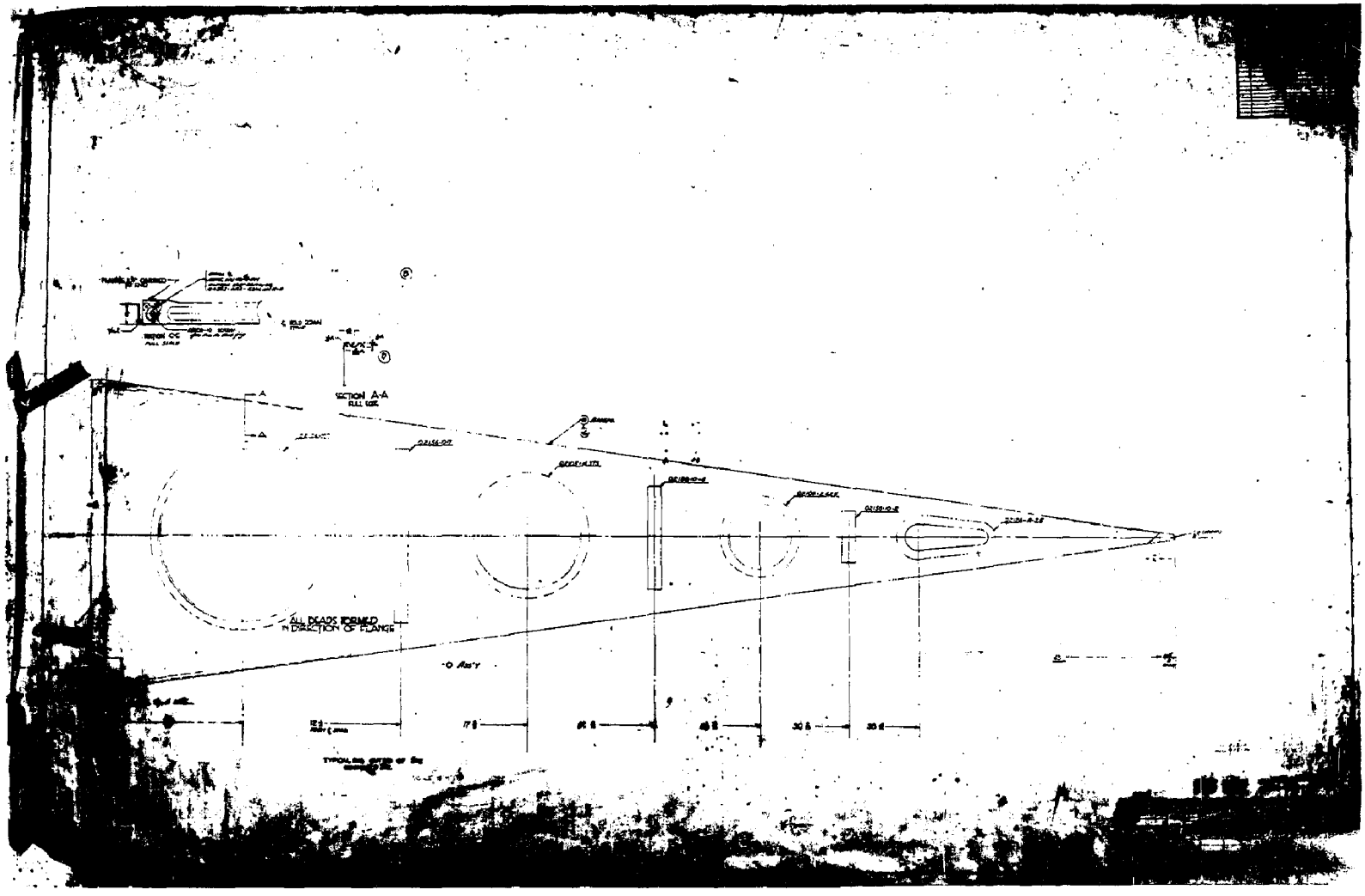
FW 633 125 PADS 11-43

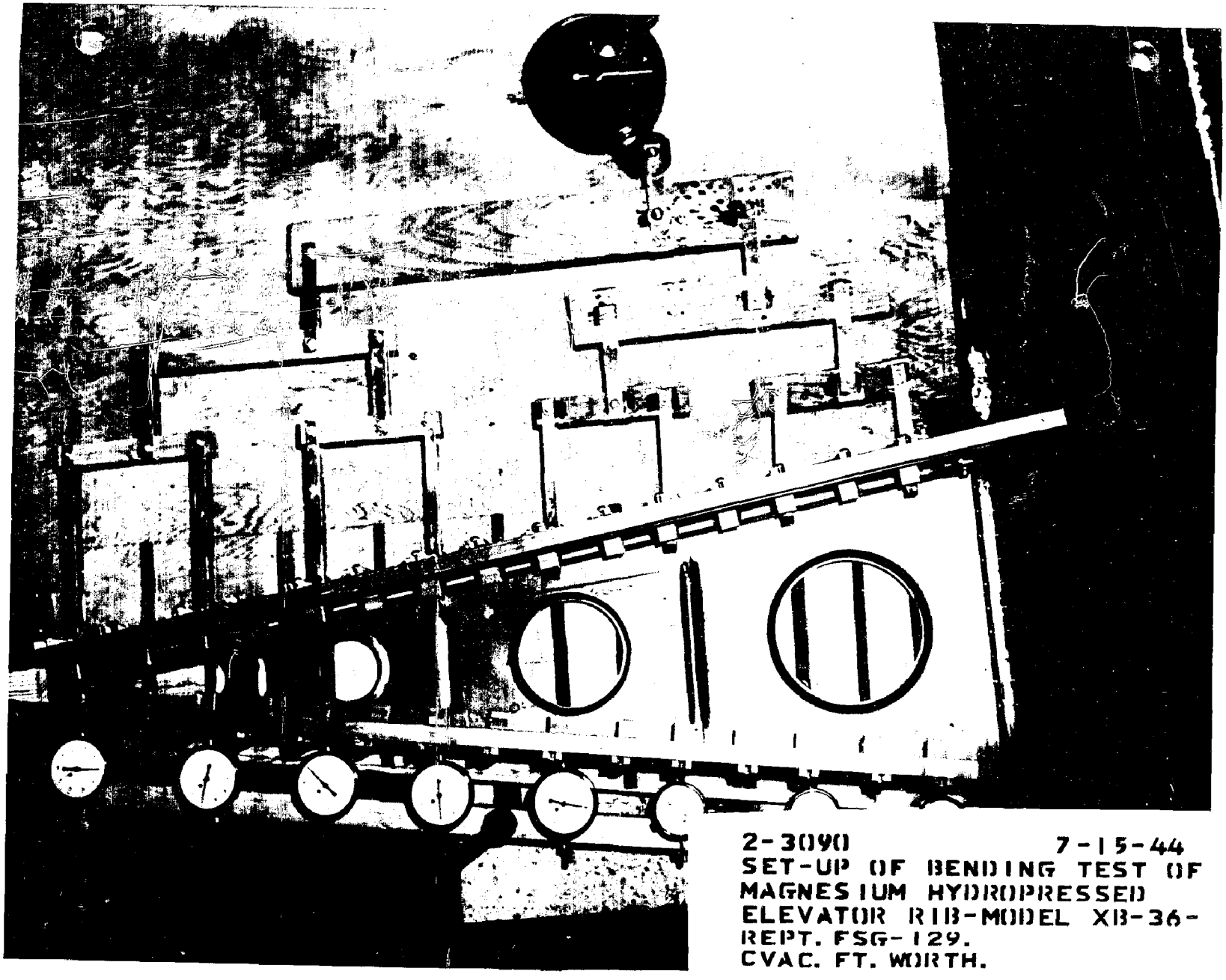
TABLE I.

% ULT.	DYN. READ.	DEFLECTION 10^{-3} IN. 1	2	3	4	5	6	7	8
				NO. 1					
0	0	0	0	0	0	0	0	0	0
10	33	6	4	4	6	8	10	11	12
20	66	14	11	13	17	22	27	30	35
30	99	22	19	24	31	40	49	55	66
40	132	25	24	31	41	51	62	71	85
50	165	27	28	37	49	61	75	86	103
60	198	29	33	44	59	74	90	103	124
66.7	220	31	35	47	62	78	95	109	131
0.	0	0	0	0	0	0	0	0	0
—	400	ULT. LOAD, 120% OF DUL							
				NO. 2					
0	0	0	0	0	0	0	0	0	0
10	33	1	1	2	3	3	4	3	6
20	66	2	4	6	8	9	12	13	18
30	99	6	7	11	13	17	22	24	31
40	132	8	10	15	18	22	28	31	40
50	165	10	12	18	21	26	35	39	50
60	198	12	15	21	27	34	45	49	63
66.7	220	13	17	24	30	37	49	54	68
0	0	0	0	0	0	0	0	0	0
—	425	ULT LOAD, 129% OF DUL							
				NO. 3					
0	0	0	0	0	0	0	0	0	0
10	33	1	1	2	2	5	6	7	9
20	66	1	3	4	6	9	12	16	19
30	99	1	5	7	9	15	20	25	32
40	132	2	7	9	12	19	25	32	41
50	165	2	8	10	15	24	32	41	51
60	198	3	10	14	21	32	42	53	68
66.7	220	4	12	17	25	37	48	61	78
0	0	0	0	0	0	0	0	0	0
—	415	ULT. LOAD 126% OF DUL							

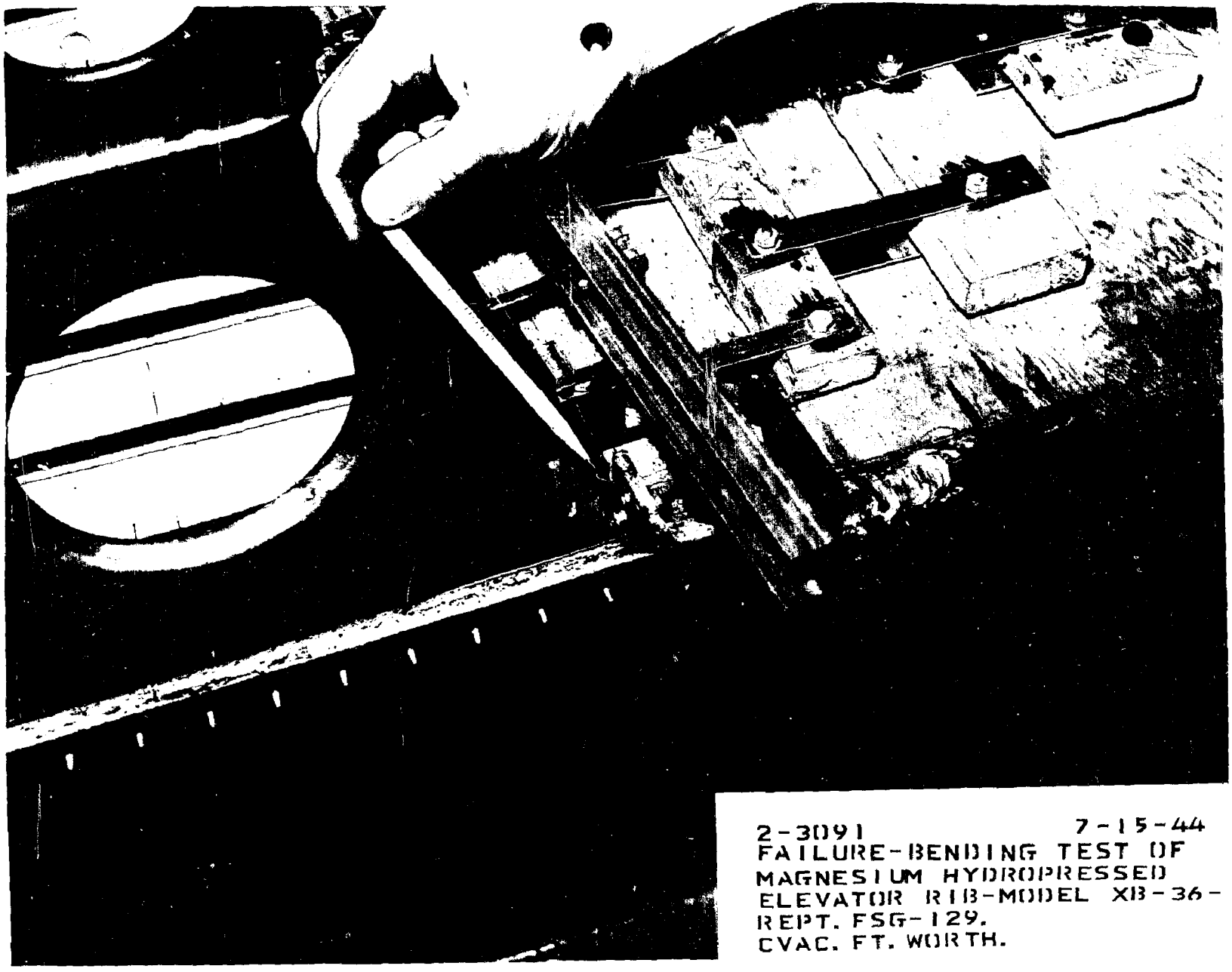
Consolidated Vultee Aircraft Corporation
FORT WORTH DIVISION
FORT WORTH, TEXAS

PHOTOGRAPHIC INDEX


SECTION A-A
ALL BEADS FORMED
IN DIRECTION OF FLANGE



2-3090 7-15-44
SET-UP OF BENDING TEST OF MAGNESIUM HYDROPRESSED ELEVATOR RIB-MODEL XB-36-
REPT. FSG-129.
CVAC. FT. WORTH.



2-3091 7-15-44
FAILURE-BENDING TEST OF
MAGNESIUM HYDROPRESSED
ELEVATOR RIB-MODEL XB-36-
REPT. FSG-129.
CVAC. FT. WORTH.

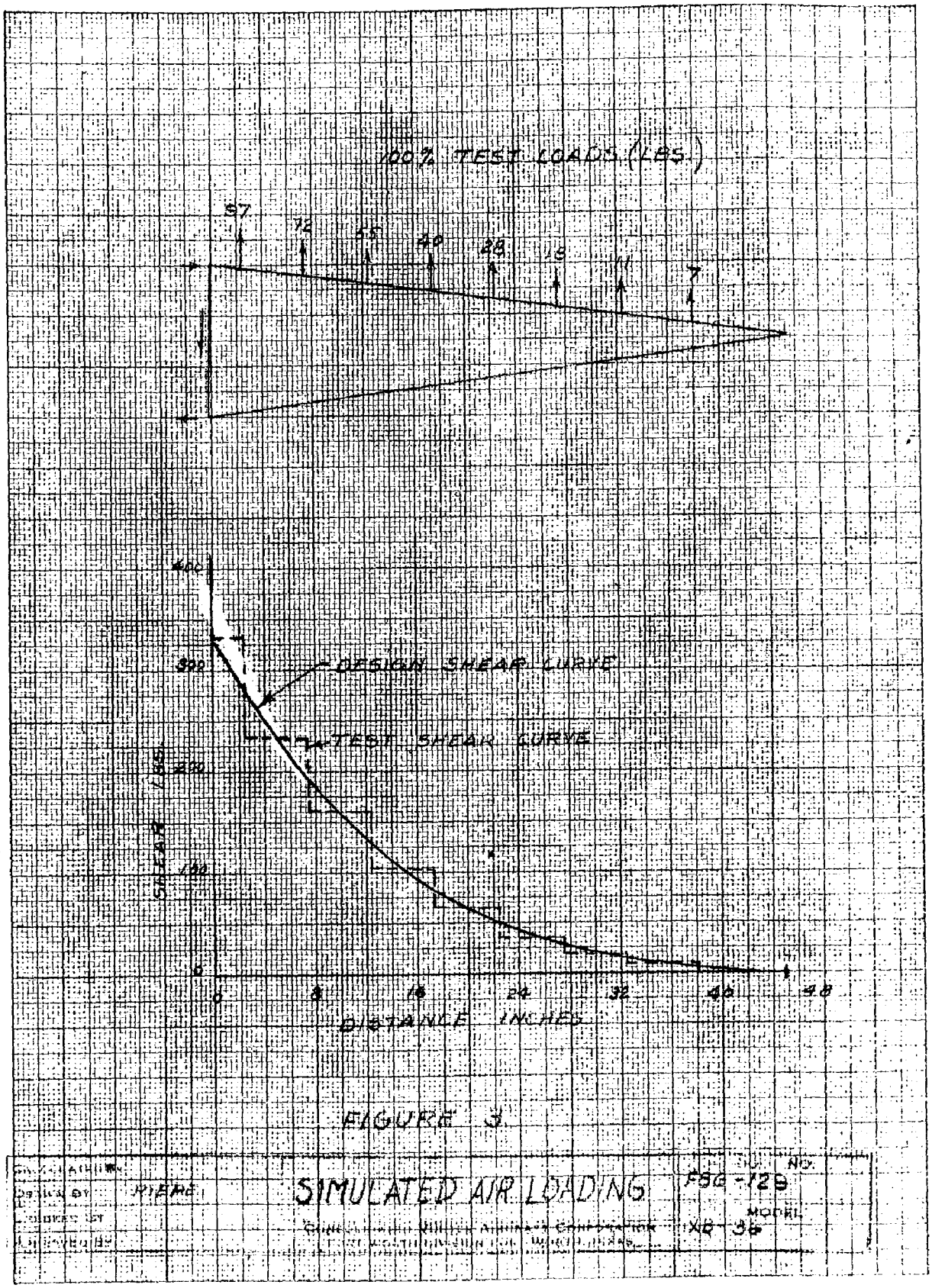


FIGURE 3

SIMULATED AIR LOADING

FSG-12B

XB-36

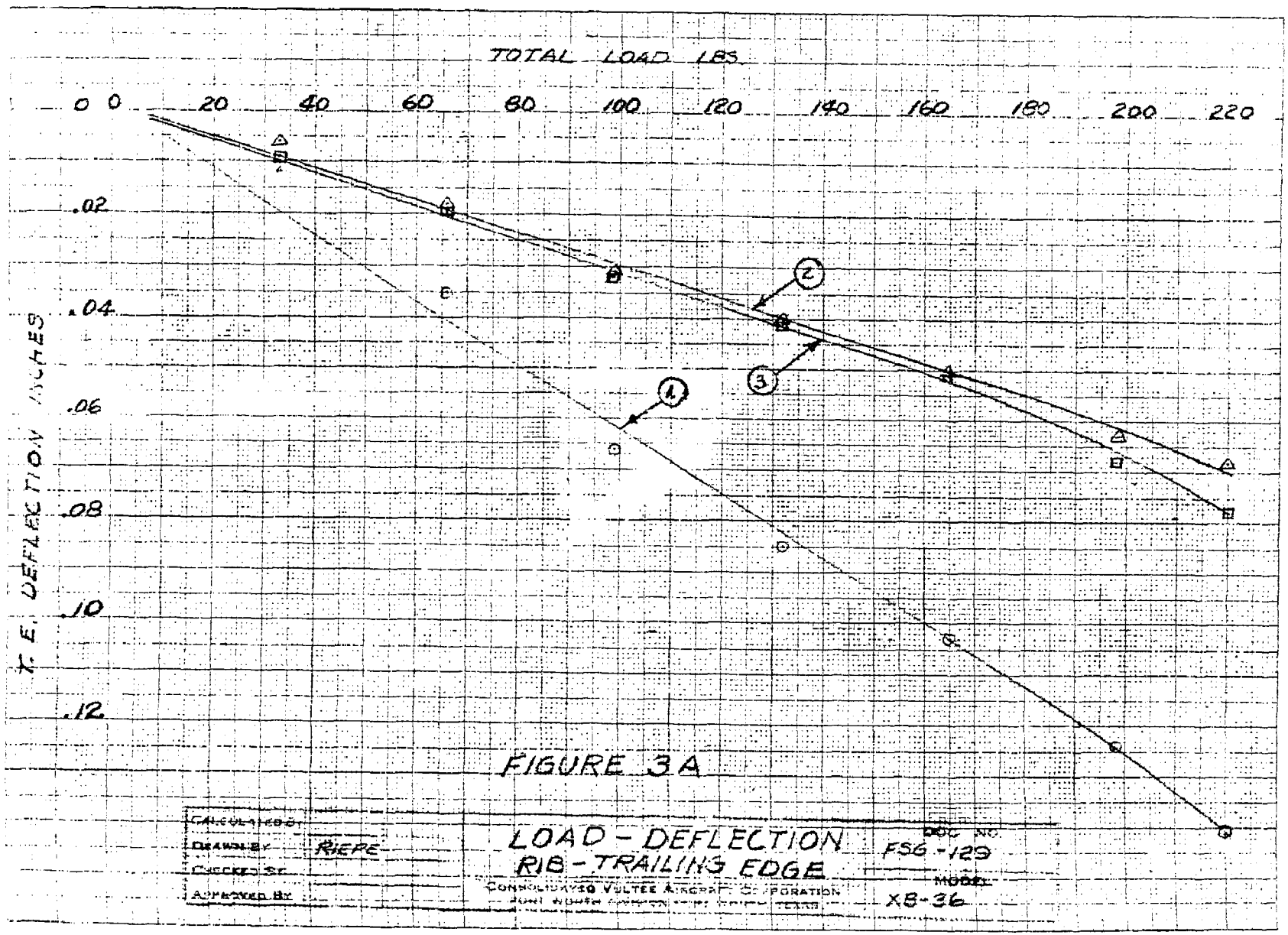


FIGURE 3A

CALCULATED
DRAWN BY RIEPE
CHECKED BY
APPROVED BY

LOAD - DEFLECTION
RIB - TRAILING EDGE

CONSOLIDATED VULTEE AIRCRAFT CORPORATION
FORT WORTH DIVISION OF CONSOLIDATED VULTEE AIRCRAFT CORPORATION, FORT WORTH, TEXAS

DOC. NO. FSG-129
MODEL XB-36

79A4